

ABSTRACT OF THE DISCLOSURE

An ultra-high density data storage device using phase-change diode memory cells, and having a plurality of emitters for directing beams of directed energy, a layer for forming multiple data storage cells and a layered diode structure for detecting a memory or data state of the storage cells, wherein the device comprises a phase-change data storage layer capable of changing states in response to the beams from the emitters, comprising a material containing copper, indium and selenium. A method of forming a diode structure for a phase-change data storage array, having multiple thin film layers adapted to form a plurality of data storage cell diodes, wherein the method comprises depositing a first diode layer of material on a substrate, and depositing a second diode layer of phase-change material on the first diode layer, the phase-change material containing copper, indium and selenium.